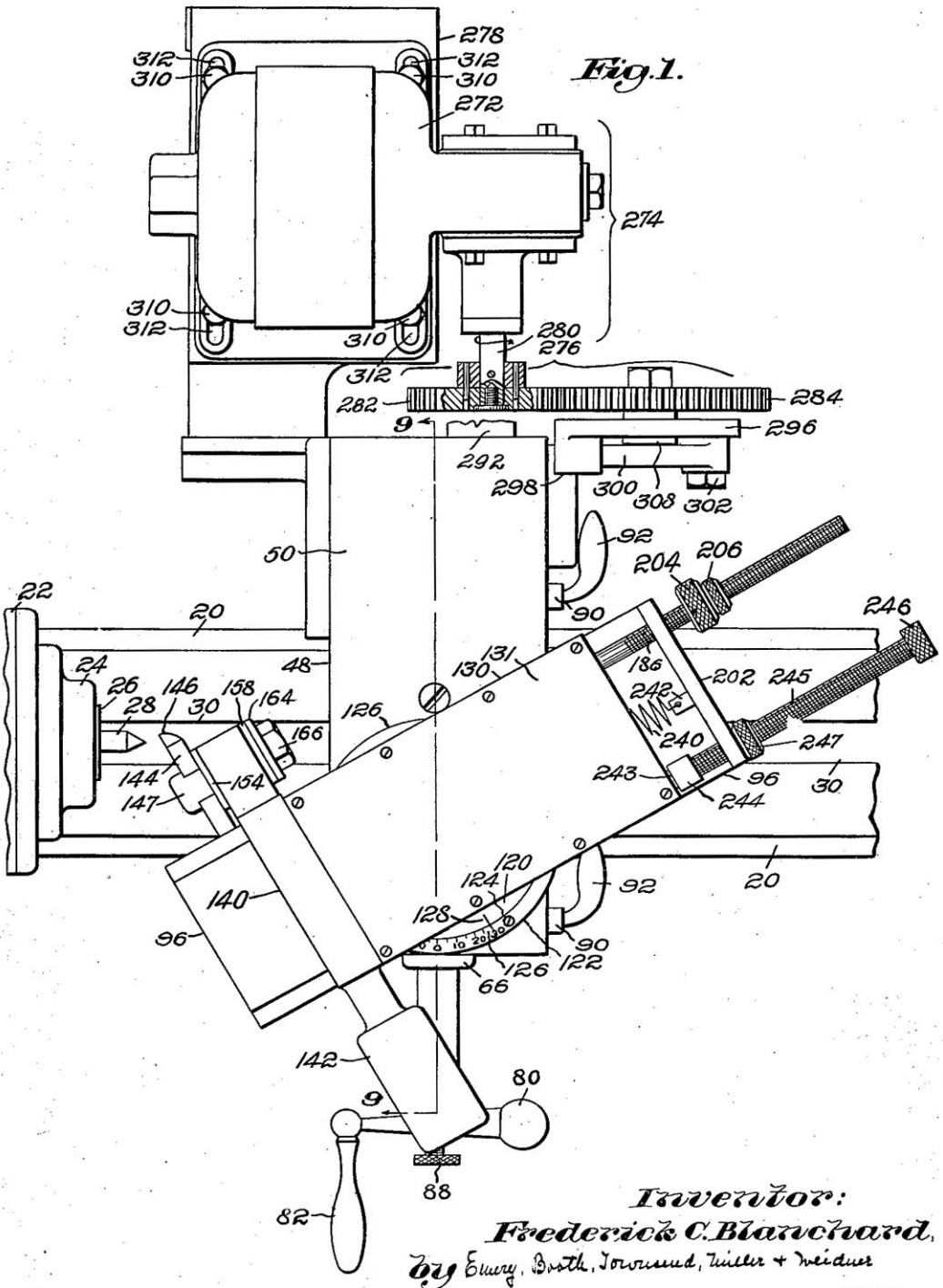
Dec. 29, 1936. F. C. BLANCHARD 2,065,933

UNIVERSAL AUTOMATIC SLIDE REST

Filed Dec. 20, 1935 7 Sheets-Sheet 1

Fig. 1.



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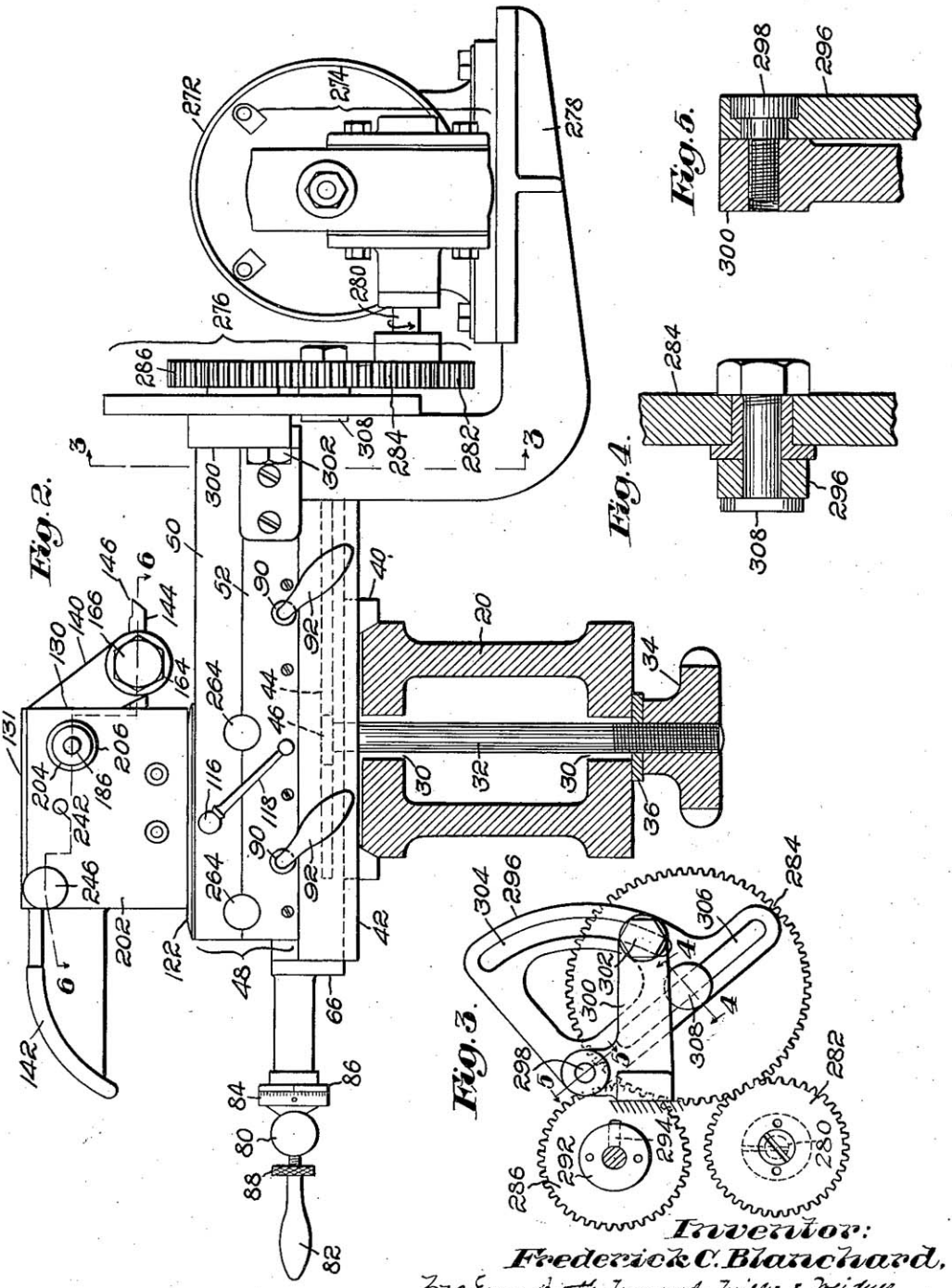
Filed Dec. 20, 1935 7 Sheets-Sheet 2



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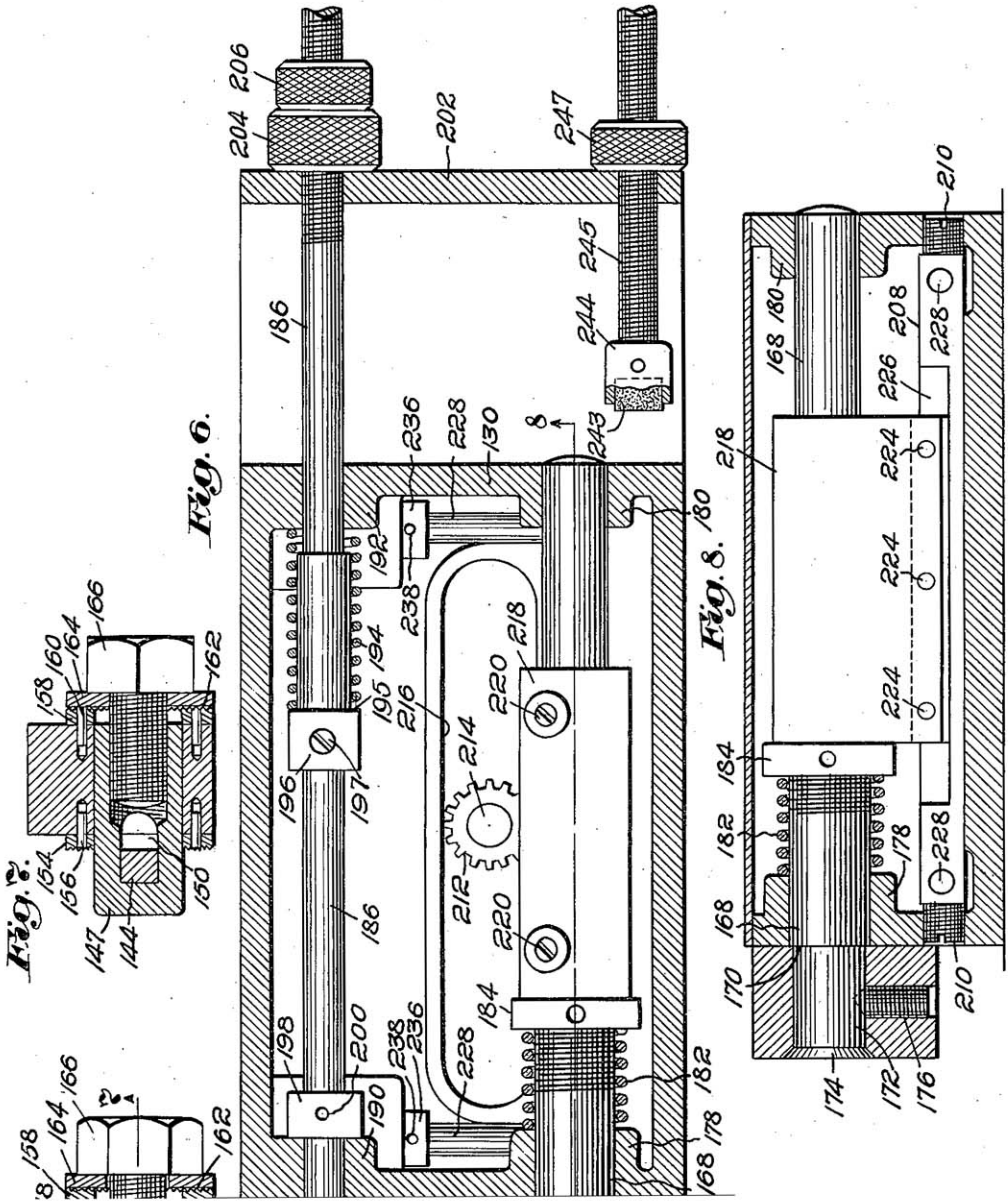
UNIVERSAL AUTOMATIC SLIDE REST

Filed Dec. 20, 1935 7 Sheets-Sheet 3



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UNIVERSAL AUTOMATIC SLIDE REST

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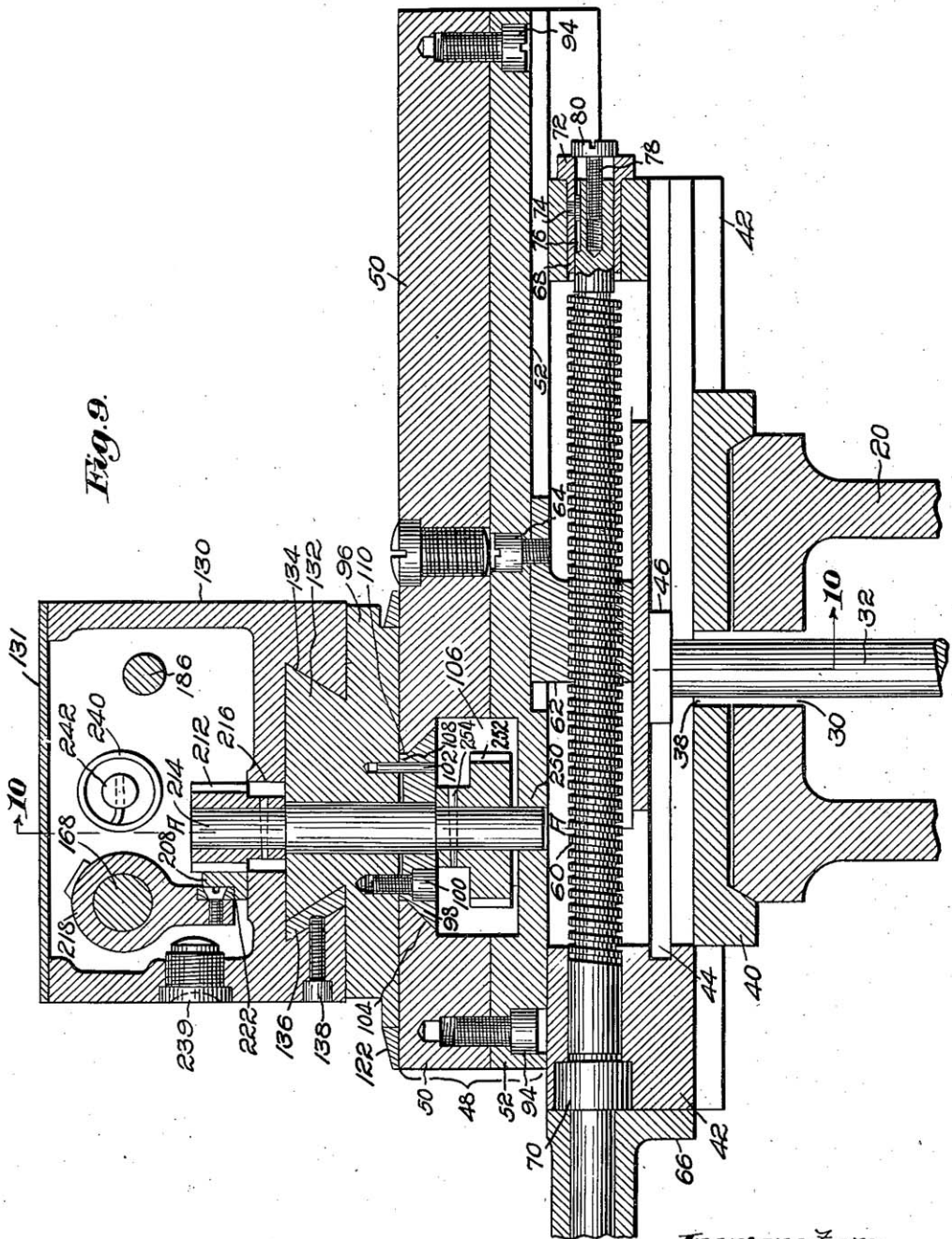
Fig. 9.



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UNIVERSAL AUTOMATIC SLIDE REST

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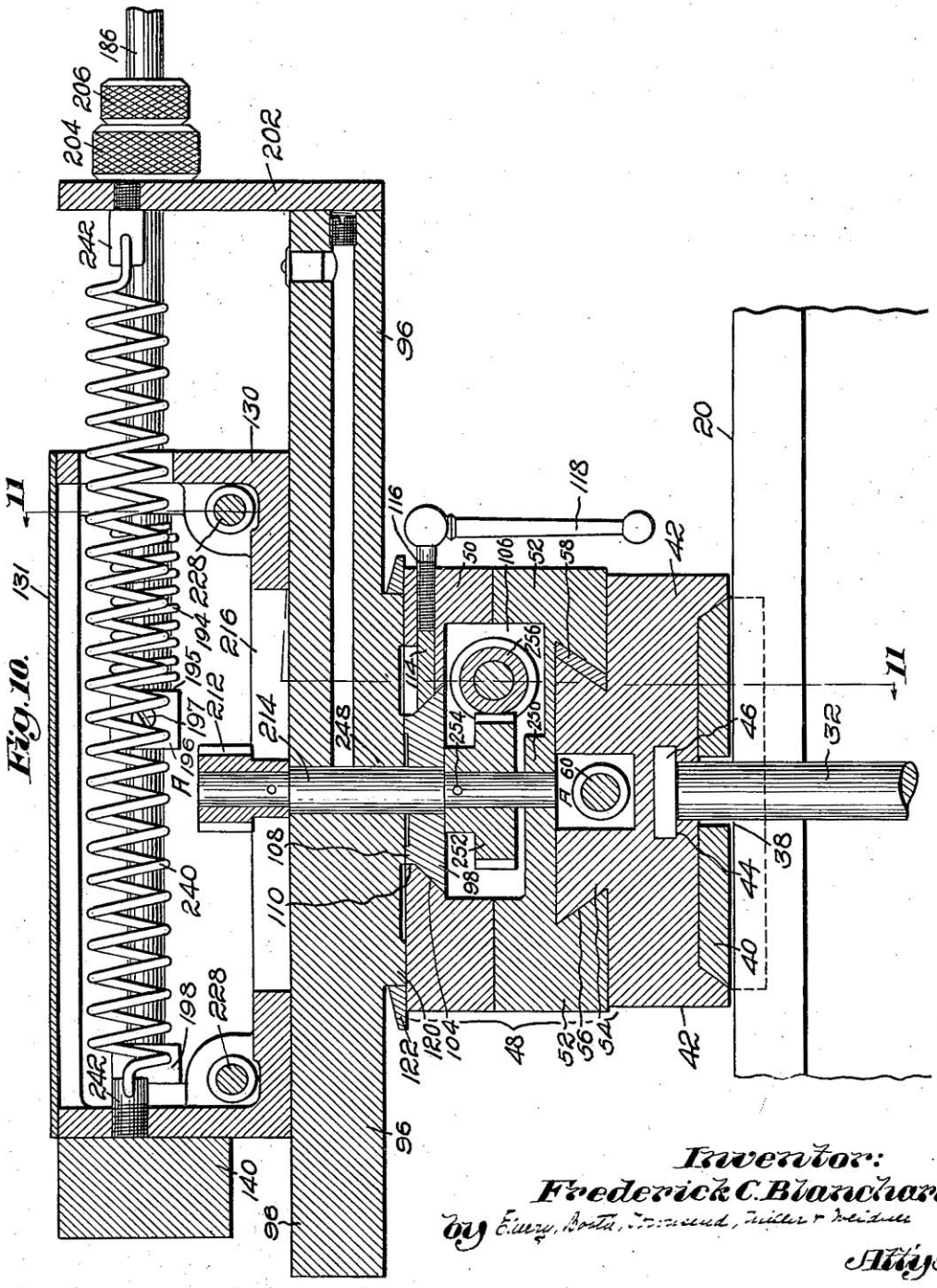

Fig. 10.

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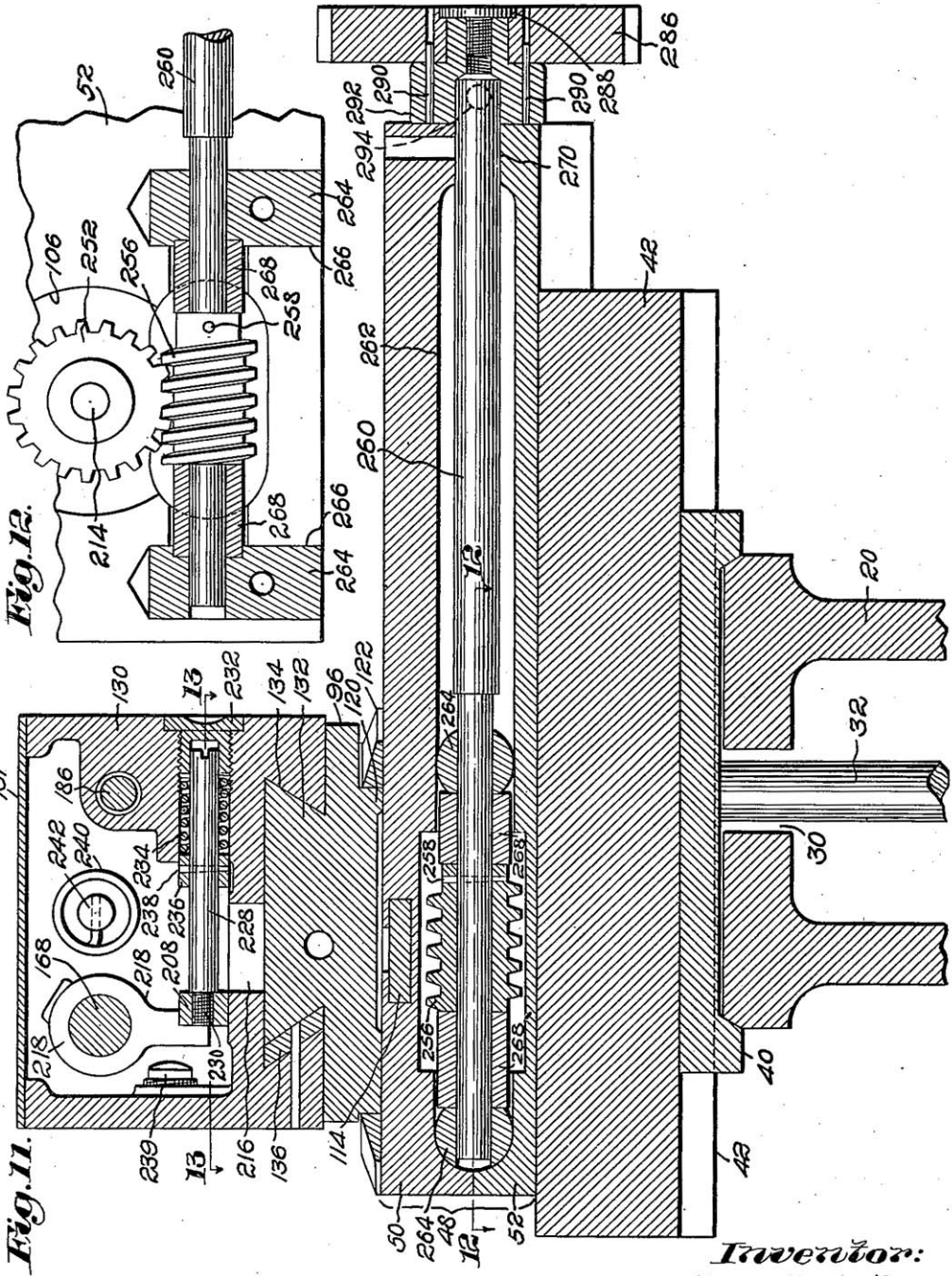
UNIVERSAL AUTOMATIC SLIDE REST

Filed Dec. 20, 1935 7 Sheets-Sheet 6



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UNIVERSAL AUTOMATIC SLIDE REST

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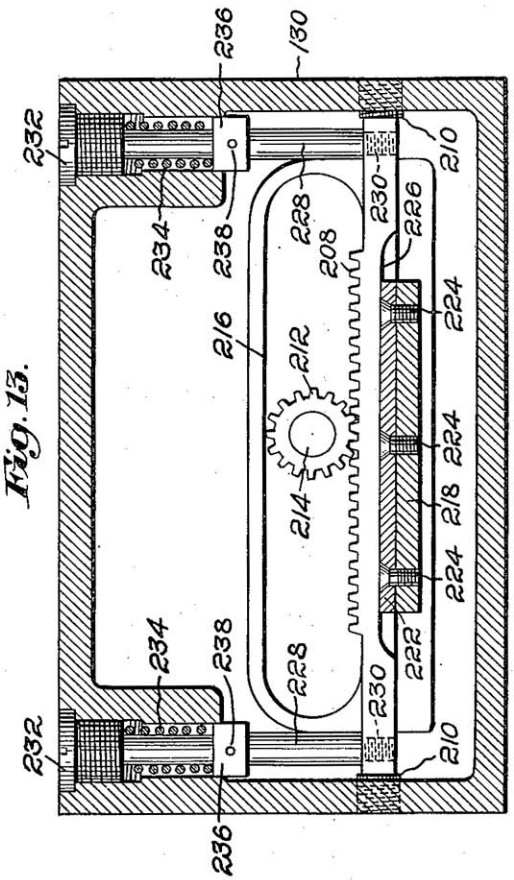

Fig. 13.

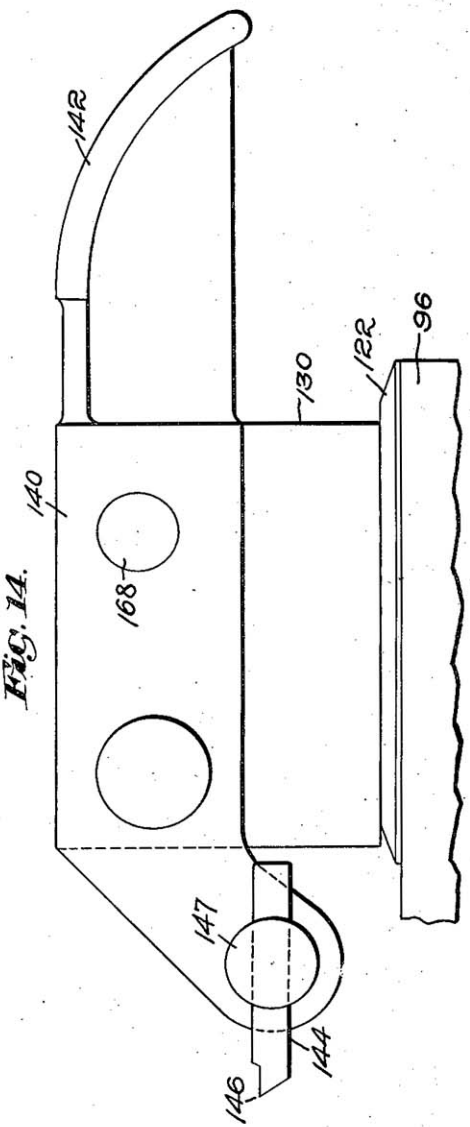

Fig. 14.

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UNITED STATES PATENT OFFICE

2,065,933

UNIVERSAL AUTOMATIC SLIDE REST

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Application December 20, 1935, Serial No. 55,452

24 Claims. (Cl. 82—12)

This invention relates to a universal, automatic slide rest for lathes, and will be understood by reference to the following description when taken in connection with the accompanying drawings of one specific embodiment thereof, while its scope will be pointed out more particularly in the appended claims.

In the drawings:

Fig. 1 is a plan of a portion of a lathe equipped with a universal, automatic slide rest embodying the invention, with the top side obliquely disposed for taper turning;

Fig. 2 is a side elevation of the slide rest as viewed from the right hand side of Fig. 1, but with the top slide swung parallel with the axis of rotation of the work, as it would be in cylindrical turning, and in this view the lathe bed and the clamping knob or nut are shown in section in a vertical plane;

Fig. 3 is a vertical, sectional view on line 3—3 of Fig. 2 illustrating the change-gear mechanism;

Fig. 4 is a sectional view on line 4—4 of Fig. 3;

Fig. 5 is a sectional view on line 5—5 of Fig. 3;

Fig. 6 is a horizontal, sectional view on line 6—6 of Fig. 2;

Fig. 7 is a vertical, sectional view on line 7—7 of Fig. 6, illustrating the clamping of the tool bit in the tool holder;

Fig. 8 is a vertical, sectional view on line 8—8 of Fig. 6, illustrating the tool holder rock-shaft, the rack dog and associated parts;

Fig. 9 is a vertical, sectional view on line 9—9 of Fig. 1;

Fig. 10 is a vertical, sectional view on line 10—10 of Fig. 9;

Fig. 11 is a vertical, sectional view on line 11—11 of Fig. 10;

Fig. 12 is a horizontal, sectional view on line 12—12 of Fig. 11;

Fig. 13 is a horizontal, sectional view on line 13—13 of Fig. 11; and

Fig. 14 is an elevation of the tool holder, tool

slot 44 to receive a T head 46 formed on the upper end of the bolt. Thus, by loosening the knob 34, the slide rest shoe 40 may be adjusted longitudinally of the lathe bed, and the base 42 may be adjusted transversely of the bed.

The base 42, in turn, supports a bottom slide 48 comprising an upper half 50 and a lower half 52, the latter being mounted to slide longitudinally upon and guided by the base 42, as by a dovetail guide 54 projecting upwardly from the base into a dovetail groove 56 in the lower half 52 of the bottom slide 48, there being a gib 58 between one side of the guide and one side of the groove. Longitudinal adjustment of the bottom slide (i. e. transversely of the lathe bed) is effected by a feed screw 60 which, as shown in Fig. 9, has threaded engagement with a feed nut 62 suitably secured, as by a screw 64, to the bottom slide 48.

The feed screw, near its front end, is mounted in a bearing plate 66, and at its rear end in a sleeve 68, and it is held against longitudinal movement by an enlargement or collar 70 near its front end, and by an enlargement or flange 72 on the rear end of the sleeve 68 and resting against the rear face of the base 42. Relative rotation of the screw 60 and the sleeve 68 is prevented by a key 74 in a key way 76, and end play is taken up by an adjusting screw 78 threaded into the rear end of the feed screw and having a head 80 resting against the rear end of the sleeve 68.

Secured to the front end of the feed screw is a ball handle 30 (see Fig. 2) to which is secured a handle 82 constituting a crank, by means of which the feed screw may be rotated. The extent of rotation is indicated by an indicator dial 84 affixed to the feed screw and cooperating with an indicator flange 86 affixed to the bearing plate 66. A binder screw 88 threaded axially into the front end of the feed screw binds the dial 84. To clamp the bottom slide 48 securely to the base 42, I have provided two binders, herein

sponding cylindrical surface 110 above the conical surface 104.

To secure the swivel in its desired angular relationship to the bottom slide, a gib 114 (see Fig. 10) is forced against the cone 103 by a binder, herein a screw 116 threaded through the side of the upper half 52 of the bottom slide 48 and provided at its outer end with a handle 118. To indicate the angular relationship between the swivel 96 and the bottom slide 48, the swivel is provided with a cylindrical projection 120 about which is a graduated ring 122 secured as by screws 124 to the upper surface of the bottom slide, and provided with a set of graduations 126, in degrees, cooperating with an index mark 128 on an exposed portion of the cylindrical projection 120.

The swivel 96, in turn, supports a hollow, box-like top slide 130 which, as shown in Fig. 9, is provided at its top with a cover 131, and is guided at its bottom by a dovetail guide 132 projecting upwardly into a dovetail groove 134, in the top slide, there being a gib 136 between one side of the guide and one side of the groove, and held in place by screws 138. Thus, the top slide is mounted to slide longitudinally upon the swivel 96. The top slide carries at one end a tool holder 140 (best shown in Fig. 6) having at one end a handle 142 and at its other end a tool bit 144 whose cutting edge 146, during the cutting operation, is in a horizontal plane containing the axis of rotation of the work piece 28 and the lathe spindle.

The tool bit is suitably mounted on the tool holder as by a tool bit shank 147 which is a cylindrical piece extending through a correspondingly shaped opening 148 in the tool holder. The tool bit extends through a slot 150 in the tool bit shank and rests against a roughened face 152 of a washer 154 whose opposite face rests against the tool holder 140 and is held against rotation by the dowel pins 156 passing through the washer and into the tool holder. A similar washer 158, similarly held against rotation by dowel pins 160 and having a similarly roughened face 162, is engaged by a similarly roughened face of a collar 164. A cap screw 166, whose head engages the outer face of the collar 164, is threaded axially into the tool bit shank 147 and, by drawing the tool bit 144 against the washer 154, clamps the tool bit firmly to the tool holder 140.

The tool holder is fixedly secured to one end of a tool holder rockshaft 168 (see Figs. 7 and 8) as by providing the latter with a shoulder 170 and a reduced portion 172, the latter being riveted at the outer end, as at 174. A set screw 176 threaded into the tool holder and engaging

to slide longitudinally in bearings 190 and 192 presented by the top slide 130 and it is urged into interlocking engagement with the tool holder by a compression spring 194, one end of which rests against the bearing 192 and the other against a shoulder 195 presented by a sleeve 196 which is secured to the locking pin by a set screw 197. Movement of the locking pin, under the influence of the spring, is limited by a stop collar 198 secured as by a pin 200 to the locking pin.

As the top slide 130 is advanced by mechanism presently to be described, the locking pin remains in interlocking engagement with the tool holder until, at a predetermined point in the advance of the slide, the locking pin is prevented from advancing further by means, now to be described, which causes the locking pin to be withdrawn from its interlocking engagement with the tool holder. Secured to the rear end of the swivel 96 is an end plate 202 through which the locking pin 186 passes loosely. The locking pin is threaded to receive a knurled stop nut 204 which, by rotation on the pin, may be adjusted lengthwise of the pin, and its adjustment is maintained by a knurled lock nut 206 also threaded onto the locking pin. The point at which the locking pin will start to withdraw from the bushing 188 is determined by adjustment of the stop nut 204 lengthwise of the locking pin. When the locking pin is entirely withdrawn from the bushing, the tool holder, carrying the tool bit, will rock downwardly about the axis of the rockshaft 168 under the influence of springs presently to be described.

The top slide 130, and the tool holder 140 and the tool bit 144, are advanced by mechanism now to be described, reference being had, at first, to Fig. 13. A rack 208, maintained against lengthwise movement with relation to the top slide 130 by two plugs 210, one at each end, threaded into the ends of the top slide, is adapted to mesh with a pinion 212 securely affixed to the upper end of a shaft 214 which extends through a slot 216 extending lengthwise in the bottom of the top slide 130. During the advance of the top slide and during the time when the tool holder is locked by the locking pin, the rack 208 is maintained meshed with the pinion 212 by a rack dog 218, secured to the rockshaft as by set screws 220 (see Fig. 6), and having a hardened strip 222 (see Fig. 13), secured thereto as by screws 224, and engaging a face 226 on the back of the rack.

The rack 208 is carried by rods 228 to which it is secured as by threading the rods into the rack at 230, and these rods, at their other ends, slide in and are guided by plugs 232 which are

spring 240 (see Fig. 10), whose ends are hooked onto studs 242, one threaded into the front end of the top slide 130, and the other into the end plate 202 of the swivel 96. The return movement of the top slide under the influence of the spring is limited by a stop, herein a cushion disk 243 (see Fig. 6) mounted in a socket 244 secured to the front end of a stop screw 245 which is threaded into the end plate 202 for lengthwise adjustment and is provided at its rear end with a knurled head 246 (see Fig. 1) to facilitate turning the same with the fingers. A knurled lock-nut 247 threaded onto the screw and resting against the end plate 202 maintains the adjustment.

Returning now to the mechanism which advances the top slide, and referring to Fig. 10, the shaft 214 which carries the pinion 212 extends downwardly through a bearing 248 presented by the swivel 96, and it is coaxial with the vertical axis about which the latter is adjustable. The lower end of the shaft is received in a second bearing 250 presented by the lower half 52 of the bottom slide 48. Above this bearing, and within the chamber 106, there is a worm gear 252 which is suitably secured, as by a pin 254, to the shaft 214, and this worm gear meshes with and is driven by a worm 256.

Referring now to Figs 11 and 12, the worm 256 is secured as by a pin 258 to a worm shaft 260 which extends lengthwise within a chamber 262 formed partly within each of the upper and lower halves 50 and 52 of the bottom slide 48. The shaft is mounted in two bearings 264 inserted in holes 266 presented by the upper and lower halves of the top slide and is maintained against lengthwise displacement by sleeves 268 interposed between the bearings 264 and the ends of the worm 256. The rear end of the shaft 260 turns in an additional bearing 270 presented by the upper and lower halves of the top slide, and it extends thence to the exterior.

The worm shaft is driven by appropriate mechanism, herein an electric motor 272 (see Fig. 1), a reduction gear 274, and a change gear train 276, all of which are carried by the bottom slide 48. The motor is mounted on a motor stand 278 affixed to the bottom slide 48, and the reduction gear 274 is built onto the motor as is common with such drives. The reduction gear has a shaft 280 to which is affixed a change gear 282 (see Figs. 1 and 2) which is the first gear of the change speed train. In practice, the change speed train comprises a number of changeable gears by means of which various gear ratios may be obtained, but it is deemed unnecessary to show and to describe the entire gear set. It will suffice to state that one possible combination is shown and it comprises an idler gear 284 meshing with and driven by change gear 282 and in turn meshing with and driving a change gear 286, the latter being removably secured as by a screw 288 (see Fig. 11) and dowel pins 290 to a collar 292 commonly called a "spud" fixedly secured to the rear end of the worm shaft 260 as by a set screw 294. The change gear 282 is secured in like manner to the reduction gear shaft 280, as shown in Fig. 1, in which the gear 286 is omitted and the collar 292 is partly broken away to show the gear 282 and its attachment to the shaft 280. Hence, the change gears 282 and 286 are interchangeable with each other.

Returning now to Fig. 3, to accommodate change gears 284 and 286 of different diameters, there is provided a quadrant 296 pivoted on a stud 298 on a bracket 300, to which it may be secured in various angular positions by a bolt 302 extending through a segmental slot 304 and supported by the bracket 300, and this quadrant is provided with a slot 306 in which a stud 308, carrying the gear 284 is radially adjustable with reference to the stud 298. No further description of the change gear set is deemed necessary to a proper understanding of the invention.

The general operation and mode of use will now be described, reference being had at first to Fig. 1. The slide rest is universal, and may be employed for straight turning, for facing, and for taper turning, that is to say, the setting of the swivel 96 may be anywhere from 0° to 90°, and this is accomplished by first loosening the binder screw 116 (Fig. 10), then swinging the swivel to the desired angle shown by the graduations 126 on the dial plate 122, and finally tightening the binder screw. As shown in Fig. 1, the swivel is set for a 30° taper. If facing is to be done from the center outwardly, the tool bit shank 147 should be removed and reversed from the position shown so that the tool bit 144 will occupy a position at the opposite side of the tool holder 140.

Next, the binding screws 90 for the bottom slide 48 should be loosened, and the knob 34 beneath the bed 20 should also be loosened. Then, with the top slide 130 retracted to some such position as that shown in Fig. 1, and with the tool bit 144 set with its cutting edge 146 on a level with the axis of the work 28, the entire slide rest should be set in the proper working position. Then the knob 34 and the binding screws 90 should be tightened, and if necessary the cutting edge of the tool bit should be readjusted accurately to the level of the axis of the work by loosening the screw 166, turning the tool bit shank 147, and then tightening the screw 166.

The stop screw 245 should be adjusted so that in the retracted position of the top slide 130, the cutting edge 146 of the tool bit 144 will occupy a position somewhat to the right of the work 28, in practice about one eighth of an inch. The travel of the tool bit should be determined by setting the stop nut 204 at the correct position on the locking pin 186 so that the latter will be withdrawn from its interlocking engagement with the tool holder 140 at the proper instant.

When all settings have been made, the tool bit 144 is dropped away from the horizontal plane containing the axis of the work, and the rack 208 is disengaged from the pinion 212 by retracting the locking pin 186. The motor 272 is now started and is left running continuously while the slide rest is in use. Then a downward pressure of the hand upon the handle 142 of the tool holder 140 elevates the tool bit to the plane of the work axis, the locking pin 186 snaps into place in the bushing 188, the rack 208 is meshed with the pinion 212, and the top slide starts to advance, carrying the tool bit 144 along the work 28.

When the tool bit 144 nears the predetermined position, the stop nut 204 contacts the end plate 202, and after a further slight advance, the locking pin is withdrawn from its interlocking engagement with the tool holder 140, whereupon the springs 234 assert themselves to retract the rack 208 out of mesh with the pinion 212. The tool bit 144 drops away from the work under the influence of the springs 234, and the top slide, no longer driven by its driving mechanism, is

returned by the return spring **240** and strikes the cushioning stop **243**. Inasmuch as the tool bit **144** has dropped away from the work, no mark is left on the latter during the retraction of the top slide **130**. The work piece is then removed from the collet **26** and replaced by another one, after which, pressure on the handle **142** elevates the tool bit and starts a new cycle of operation.

A wide range of feed rates may be obtained by appropriate substitutions of change gears in the gear set **276**. If the feed gearing is to be compounded, i. e. by the substitution of a pair of compound gears secured together axially, more room is required for the gear set, and the motor **272** must be backed away the required distance by loosening four clamping screws **310** extending through slots **312** in the motor base and threaded into the motor stand **278**.

Having thus described one embodiment of the invention, but without limiting myself thereto, what I claim and desire, by Letters Patent, to secure is:

1. In a lathe, the combination of a bed, a tool holder, a top slide which carries said tool holder, a swivel on which said top slide is horizontally slidable, a bottom slide on which said swivel is mounted for adjustment about a vertical axis, a base on which said bottom slide is horizontally slidable transversely of said bed, power-driven means for advancing said top slide to move the tool along the work, means for causing disconnection of said top slide from said power-driven means and for moving said tool holder transversely of the axis of the work to carry the tool out of engagement with the work, and means for causing retraction of said top slide in a direction opposite to the direction of advance by said power-driven means.

2. In a lathe, the combination of a bed, a tool carrier, a top slide which carries said tool carrier, a swivel on which said top slide is horizontally slidable, a bottom slide on which said swivel is mounted for adjustment about a vertical axis, a base on which said bottom slide is horizontally slidable transversely of said bed, mechanism for causing advance of said top slide to move the tool along the work during the turning operation, and including means for interrupting the advance of said top slide at a predetermined point in its advance, and means for causing retraction of said tool holder after its advance has been interrupted.

3. In a lathe, the combination of a bed, a tool carrier, a top slide which carries said tool carrier, a swivel on which said top slide is horizontally slidable, a bottom slide on which said swivel is mounted for adjustment about a vertical axis, a base on which said bottom slide is horizontally slidable transversely of said bed, mechanism for causing advance of said top slide to move said tool carrier along the work during the turning operation, and including means for interrupting the advance of said top slide at a predetermined point in its advance, and means yieldingly resisting the advance of said top slide and restoring the same to its starting position.

4. In a lathe, the combination of a bed, a top yieldingly resisting the advance of said top slide on which said top slide is horizontally slidable, a bottom slide on which said swivel is mounted for adjustment about a vertical axis, a base on which said bottom slide is horizontally slidable transversely of said bed, tool carrier advancing mechanism including means to interrupt the advance of said top slide at a predetermined point in its advance and to move said tool carrier transversely of and from the work, and means to cause retraction of said top slide in a direction opposite to its direction of advance.

5. In a lathe, the combination of a bed, a tool holder, a top slide which carries said tool carrier, a swivel on which said top slide is horizontally slidable, a bottom slide on which said swivel is mounted for adjustment about a vertical axis, a base on which said bottom slide is horizontally slidable transversely of said bed, means for advancing said top slide, means for utilizing advance of said top slide to stop its advance, and means for retracting said top slide.

6. In a lathe, the combination of a bed, a tool holder, a top slide which carries said tool carrier, a swivel on which said top slide is horizontally slidable, a bottom slide on which said swivel is mounted for adjustment about a vertical axis, a base on which said bottom slide is horizontally slidable transversely of said bed, means including a power-driven member for advancing said top slide, means consequent upon advance of said top slide to cause disconnection of said top slide from said power-driven member, and means consequent upon such disconnection to cause retraction of said top slide.

7. In a lathe, the combination of a bed, a tool carrier, a top slide which carries said tool carrier, a swivel on which said slide is mounted, a bottom slide on which said swivel is mounted for adjustment about a vertical axis, tool carrier advancing mechanism for advancing said top slide relatively to said swivel, the same including means to interrupt the advance of said top slide at a predetermined point in its advance, and means for causing retraction of said top slide after its advance has been interrupted.

8. In a tool carrying mechanism for lathes, the combination of a tool holder, a top slide by which said tool holder is carried, a swivel on which said slide is mounted to slide horizontally, a bottom slide on which said swivel is mounted for adjustment about a vertical axis, a base on which said bottom slide is mounted for horizontal adjustment, mechanism carried partly by said swivel and partly by said bottom slide for advancing said top slide horizontally along said swivel, the last-mentioned mechanism including means to utilize the advance of said top slide to arrest its advance, and means yieldingly to resist said advance and to retract said top slide.

9. In a tool carrying mechanism for lathes, the combination of a tool holder, a horizontally slidable slide by which said tool holder is carried, a swivel on which said slide is supported, a support on which said swivel is mounted for adjustment about a vertical axis, a driving member supported by said support below and independently of said swivel, and mechanism operated by said driving member to impart a horizontal movement to said slide, said mechanism including means to interrupt said horizontal movement at a predetermined point in such movement, and means to impart a horizontal movement to said slide in the opposite direction.

10. In a tool carrying mechanism for lathes, the combination of a tool holder, a horizontally slidable slide by which said tool holder is carried, a swivel on which said slide is supported, a support on which said swivel is mounted for adjustment about a vertical axis, a driving member supported by said support below and independently of said swivel, and mechanism operated by

said driving member to impart a horizontal movement to said slide, said mechanism including means to utilize said horizontal movement to disconnect said slide from said driving member, and means to impart a horizontal movement to said slide in the opposite direction.

11. In a tool carrying mechanism for lathes, the combination of a tool holder, a horizontally slidable slide by which said tool holder is carried, a swivel on which said slide is supported, a support on which said swivel is mounted for adjustment about a vertical axis, a driving member supported by said support, and mechanism operated by said driving member to impart a horizontal movement to said slide, said mechanism including a horizontal shaft supported by said support, a vertical shaft rotatable about said vertical axis, a disconnectible driving connection between said vertical shaft and said slide, and means to cause a disconnection in said driving connection.

12. In a tool carrying mechanism for lathes, the combination of a tool holder, a horizontally slidable slide by which said tool holder is carried, a swivel on which said slide is supported, a support on which said swivel is mounted for adjustment about a vertical axis, a driving member supported by said support, and mechanism operated by said driving member to impart a horizontal movement to said slide, said mechanism including a horizontal shaft supported by said support, a vertical shaft rotatable about said vertical axis, a disconnectable driving connection between said vertical shaft and said slide, and means consequent upon horizontal movement of said slide to cause a disconnection in said driving connection.

13. In a tool carrying mechanism for lathes, the combination of a tool holder, a slide on which said tool holder is mounted to rock about a horizontal axis extending lengthwise of the direction of movement of said slide, a swivel on which said slide is mounted to slide horizontally, a support on which said swivel is mounted for adjustment about a vertical axis, a driving member supported by said support, and mechanism operated by said driving member to impart a horizontal movement to said slide, said mechanism including means to interrupt the driving connection between said slide and said driving member and to rock said tool holder about said horizontal axis to carry the tool from the work.

14. In a tool carrying mechanism for lathes, the combination of a tool holder, a rockshaft to which said tool holder is secured, a slide on which said rockshaft is mounted to rock about a horizontal axis extending lengthwise of the direction of movement of said slide, a swivel on which said slide is mounted to slide horizontally, a support on which said swivel is mounted for adjustment about a vertical axis, a horizontal shaft supported by said support, a vertical shaft mounted to rotate about said vertical axis and driven by said horizontal shaft, a pinion secured to said vertical shaft, a rack meshing with said pinion and transmitting motion to said slide to slide the latter horizontally, a rack dog secured to said rockshaft and maintaining said rack in mesh with said pinion, a locking pin carried by said slide, normally interlocked with said tool holder and preventing rocking of said rockshaft, a spring which moves said rack out of mesh with said pinion and rocks said rockshaft and swings said tool holder vertically when said locking pin is withdrawn from its interlocking engagement with said tool holder, and a locking pin stop which limits the advance of said locking pin and withdraws the latter from its interlocking engagement with said tool holder when said slide reaches a predetermined point in its travel under the influence of said rack.

15. In a tool carrying mechanism for lathes, the combination of a tool holder, a rockshaft to which said tool holder is secured, a slide on which said rockshaft is mounted to rock about a horizontal axis extending lengthwise of the direction of movement of said slide, a swivel on which said slide is mounted to slide horizontally, a support on which said swivel is mounted for adjustment about a vertical axis, a horizontal shaft supported by said support, a vertical shaft mounted to rotate about said vertical axis and driven by said horizontal shaft, a pinion secured to said vertical shaft, a rack meshing with said pinion and transmitting motion to said slide to slide the latter horizontally, two pins attached to said rack, two guides for said pins, respectively, a rack dog secured to said rockshaft and having an elongated face engaging and maintaining said rack in mesh with said pinion, a locking pin carried by said slide, normally interlocked with said tool holder and preventing rocking of said rockshaft, two springs which cause a parallel movement of said rack out of mesh with said pinion and act through said rack dog to rock said rockshaft and to swing said tool holder vertically when said locking pin is withdrawn from its interlocking engagement with said tool holder, and a locking pin stop which limits advance of said locking pin and withdraws the latter from its interlocking engagement with said tool holder when said slide reaches a predetermined point in its travel under the influence of said rack.

16. In a tool carrying mechanism for lathes, the combination of a tool holder, a rockshaft to which said tool holder is secured, a slide on which said rockshaft is mounted to rock about a horizontal axis extending lengthwise of the direction of movement of said slide, a swivel on which said slide is mounted to slide horizontally, a support on which said swivel is mounted for adjustment about a vertical axis, a horizontal shaft supported by said support, a vertical shaft mounted to rotate about said vertical axis and driven by said horizontal shaft, a pinion secured to said vertical shaft, a rack meshing with said pinion and transmitting motion to said slide to slide the latter horizontally, a rack dog secured to said rockshaft and maintaining said rack in mesh with said pinion, a locking pin carried by said slide, normally interlocked with said tool holder and preventing rocking of said rockshaft, a locking pin spring which tends to maintain interlocking engagement of said locking pin with said tool holder, two springs which cause a parallel movement of said rack out of mesh with said pinion and act through said rack dog to rock said rockshaft and to swing said tool holder vertically when said locking pin is withdrawn from its interlocking engagement with said tool holder, and a locking pin stop which limits the advance of said locking pin and withdraws the latter from its interlocking engagement with said tool holder when said slide reaches a predetermined point in its travel under the influence of said rack.

17. In a lathe, the combination of a bed, a headstock having a work rotating spindle, a base secured to said bed, a bottom slide mounted on

said base to slide horizontally, transversely of said bed, a swivel mounted on said slide for adjustment about a vertical axis, a top slide mounted on said swivel to slide horizontally, a rockshaft mounted on said top slide to rock about a horizontal axis, a tool holder secured to said rockshaft, a tool bit held by said tool holder and having a cutting point normally in a horizontal plane containing the axis of said spindle, a horizontally slidable tool holder locking pin slidably mounted on said top slide and normally interlocked with said tool holder to maintain said cutting point in said plane, a locking pin retaining spring tending to retain said locking pin interlocked with said tool holder, mechanism to cause advance of said top slide with relation to said swivel, said mechanism including a horizontal shaft mounted on said bottom slide, a vertical shaft rotatable about said vertical axis, a worm on said horizontal shaft, a worm gear on said vertical shaft and meshing with and driven by said worm, a spur pinion on said vertical shaft, a rack meshing with said pinion and transmitting motion to said top slide to slide the latter horizontally, guide pins on which said rack is mounted for movement into and out of mesh with said pinion, a rack dog secured to said rockshaft and maintaining said rack in mesh with said pinion when said locking pin is interlocked with said tool holder, springs which move said rack out of mesh with said pinion and which act through said rack dog, said rockshaft and said tool holder to carry said tool bit downwardly from said plane when said locking pin is withdrawn from interlocking engagement with said tool holder, an adjustable locking pin stop carried by said locking pin and cooperating with said top slide to limit advance of said locking pin as said top slide advances and to withdraw said locking pin from its interlocking engagement with said tool holder when said top slide reaches a predetermined point in its advance, thereby permitting said rack to be moved out of mesh with said pinion and said tool bit to be lowered from said plane, a top slide retracting spring which retracts said top slide when said rack is carried out of mesh with said pinion, and an adjustable stop carried by said swivel and which limits retraction of said top slide under the influence of said retracting spring.

18. In a tool carrying mechanism for lathes, the combination of a motor, a bottom slide on which said motor is mounted, a base on which said slide is mounted to slide horizontally, a swivel mounted on said slide for adjustment about a vertical axis, a top slide mounted on said swivel to slide horizontally, a tool holder carried by said top slide, and driving mechanism to transmit power from said motor to said top slide regardless of the angular relationship between said swivel and said bottom slide.

19. In a tool carrying mechanism for lathes, the combination of a motor, a bottom slide on which said motor is mounted, a base on which said slide is mounted for horizontal adjustment, means to adjust said slide horizontally with relation to said base, a swivel mounted on said slide for adjustment about a vertical axis, means to fix said swivel in the desired position of adjustment, a top slide mounted on said swivel to slide horizontally, a tool carrier carried by said top slide, and driving mechanism to transmit power from said motor to said top slide to slide the latter horizontally independently of said adjustments.

20. In a tool carrying mechanism for lathes, the combination of a motor, a bottom slide on which said motor is mounted, a base on which said slide is mounted for horizontal adjustment, a swivel mounted on said slide for adjustment about a vertical axis, a top slide mounted on said swivel to slide horizontally, a tool holder carried by said top slide, and driving mechanism to transmit power from said motor to said top slide to feed the latter horizontally, said driving mechanism including a change gear set to change the rate of feed of said top slide.

21. In a tool carrying mechanism for lathes, the combination of a motor, a bottom slide on which said motor is mounted, a base on which said slide is mounted for horizontal adjustment, a swivel mounted on said slide for adjustment about a vertical axis, a top slide mounted on said swivel to slide horizontally, a tool holder carried by said top slide, and driving mechanism to transmit power from said motor to said top slide to feed the latter horizontally, said driving mechanism including a change gear set to change the rate of feed of said top slide, said change gear set being mounted on said bottom slide.

22. In a tool carrying mechanism for lathes, the combination of a motor, a bottom slide on which said motor is mounted for horizontal adjustment, a base on which said slide is mounted for horizontal adjustment, a swivel mounted on said slide for adjustment about a vertical axis, a top slide mounted on said swivel to slide horizontally, a tool carrier carried by said top slide, and driving mechanism to transmit power from said motor to said top slide to feed the latter horizontally regardless of the settings of said adjustments, said driving mechanism including a shaft carried by said bottom slide, and a change gear set connecting said motor and said shaft to enable the rate of feed of said top slide to be changed, said gear set being mounted on said bottom slide between said motor and said shaft, the horizontal adjustment of said motor being toward and from said shaft to provide more or less room for said gear set to accommodate different combinations of gears in said gear set.

23. In a lathe, the combination of a tool carrier, a horizontally movable top slide which carries said tool carrier, a swivel which carries said slide, a bottom slide on which said swivel is mounted and is adjustable about a vertical axis, a bed on which said bottom slide is mounted to slide transversely of said bed, a motor supported by said bottom slide, and driving mechanism to transmit power from said motor to said slide to feed the latter horizontally regardless of the adjustment of said swivel about said axis.

24. In a lathe, the combination of a tool carrier, a horizontally movable top slide which carries said tool carrier, a swivel which carries said slide, a bottom slide on which said swivel is mounted and is adjustable about a vertical axis, a bed on which said bottom slide is mounted to slide transversely of said bed, a motor supported by said bottom slide, and driving mechanism to transmit power from said motor to said slide to feed the latter horizontally regardless of the adjustment of said swivel about said axis, said driving mechanism including a change gear set to change the rate of feed of said slide, said change gear set being supported by said bottom slide.

FREDERICK C. BLANCHARD.

CERTIFICATE OF CORRECTION.

Patent No. 2,065,933. December 29, 1936.

FREDERICK C. BLANCHARD.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, first column, line 51, claim 2, for the words "tool holder" read top slide; lines 67 and 68, claim 4, for "a top yieldingly resisting the advance of said top slide" read a tool carrier, a top slide which carries said tool carrier, a swivel; line 73, same claim, for "tool carrier" read a top slide; and second column, line 33-34, claim 7, for "tool carrier"read top slide; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 2nd day of March, A. D. 1937.

Henry Van Arsdale
(Seal) Acting Commissioner of Patents.